IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	Juan Manuel Cruz-Hernandez et al
Application No.	:	10/686,323
For	:	**Products and Processes for Providing Force Sensations in a User Interface**
Filed	:	October 15, 2003
Examiner	:	Calvin Ma
Art Unit	:	2629
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APPEAL BRIEF

Sir:

This is an Appeal Brief filed under 37 C.F.R. § 41.37 in connection with the final rejection of claims 1-25 in the Final Office Action mailed March 1, 2011 (hereinafter the "Final Office Action"). Each of the topics required by 37 C.F.R. § 41.37 is presented herewith and labeled appropriately.

Real Party in Interest

The real party in interest in the present application is the assignee, Immersion Corporation, 801 Fox Lane, San Jose, California 95131 (hereinafter "Appellant").

Related Appeals and Interferences

Appellant and the Appellant's legal representative know of no appeals or interferences that will directly affect, will be directly affected by, or have a bearing on the Board's decision in this appeal.

Status of Claims

Claims 1-25 (listed in Appendix A) stand finally rejected and are the substance of this appeal.

Status of Amendments

Applicant did not seek to further amend the claims in the response to the Final Office Action.

Summary of the Claimed Subject Matter

The present application has three independent claims, 1, 16, and 23. The following summary is intended to provide examples of embodiments disclosed within the present specification and is not intended to limit the full scope of the disclosure within the specification or to otherwise replace or modify the disclosure of the present application.

Claim 1 recites a method with the first element reciting "defining a graphical user interface having a plurality of graphical input elements arranged in a matrix configuration." The specification discloses one embodiment comprising a graphical keypad having a number of buttons arranged in a matrix configuration.[1]

The next element of claim 1 recites "defining a first cell, the first cell comprising a first parameter representing a first haptic effect." The specification describes a cell as being "a memory construct in which parameters represent or define haptic effects."[2] The specification discloses that cells can be defined having a parameter and representing a haptic effect.[3] In addition, the specification discloses a wide variety of haptic effects, including vibrational and kinesthetic force effects.[4]

The third element of claim 1 recites "assigning the first cell to a first graphical input element in the matrix configuration." The specification discloses that cells may be assigned to

[1] See, e.g., Specification at ¶ 33; Fig. 3.
[2] See, e.g., Specification at ¶ 28.
[3] See, e.g., Specification at ¶ 28 ("In one embodiment, the cell 10 comprises a plurality of parameters, including a wall 12, a detent 14, a location 16, and a dead-band 18."), ¶ 32 ("the cells 21 each comprise parameters inclouding a detent 24, a location 26, and a dead-band 28.").
[4] See, e.g., Specification at ¶¶ 27-29.

input elements. For example, the specification discloses that a plurality of cells can be arranged in a matrix configuration corresponding to displayed keys on a keypad.[5]

Similar to the third element, the fourth element of claim 1 recites "assigning the first cell to a second graphical input element in the matrix configuration." As noted above, the specification discloses that cells may be assigned to input elements. Further, the specification discloses that the same cell can be "repeated at multiple locations in the matrix."[6]

The fifth element of claim 1 recites "receiving a sensor signal from a sensor, the sensor configured to detect a movement of a user manipulatable object of an interface device and the sensor signal associated with the movement." The specification discloses that sensors detect movement of a manipulandum and provide sensor signals associated with that movement. For example, the specification discloses that one or more sensor may be used to detect position, motion, displacement, and other properties of the manipulandum and that the detected information is communicated to a processor.[7]

The sixth element of claim 1 recites "determining a position of a graphical object based at least in part on the sensor signal." The specification discloses that a position of a graphical object is determined based at least in part on the sensor signal, such as by disclosing that a cursor in graphical user interface (GUI) may be controlled on a display screen.[8]

The seventh element of claim 1 recites "determining an interaction between the position of the graphical object and at least one of the plurality of graphical input elements." The specification further discloses that a cursor may interact with graphical input elements, such as keys in a keypad.[9]

The eighth element of claim 1 recites "outputting the first haptic effect based at least in part on the first parameter and the interaction, the haptic effect configured to resist or assist the movement of the user manipulatable object." The specification describes that a haptic effect based on an interaction between a graphical object and a graphical input element and the corresponding cell may be generated and output to the manipulandum. For example, the

[5] See, e.g., Specification at ¶¶ 31-34.
[6] Specification at ¶ 31.
[7] Specification at ¶ 46.
[8] Specification at ¶ 41
[9] Id.

specification discloses that the cell's parameters may be used to output effects to guide a manipulated object.[10]

Claim 23 recites a computer-readable medium having program code. The first element of claim 23 recites "program code for defining a graphical user interface having a plurality of graphical input elements arranged in a matrix configuration." The specification discloses one embodiment comprising a graphical keypad having a number of buttons arranged in a matrix configuration.[11]

The next element of claim 23 recites "program code for defining a first cell, the first cell comprising a first parameter representing a first haptic effect." The specification describes a cell as being "a memory construct in which parameters represent or define haptic effects."[12] The specification discloses that cells can be defined having a parameter and representing a haptic effect.[13] In addition, the specification discloses a wide variety of haptic effects, including vibrational and kinesthetic force effects.[14]

The third element of claim 23 recites "program code for assigning the first cell to a first graphical input element in the matrix configuration." The specification discloses that cells may be assigned to input elements. For example, the specification discloses that a plurality of cells can be arranged in a matrix configuration corresponding to displayed keys on a keypad.[15]

Similar to the third element, the fourth element of claim 1 recites "program code for assigning the first cell to a second graphical input element in the matrix configuration." As noted above, the specification discloses that cells may be assigned to input elements. Further, the specification discloses that the same cell can be "repeated at multiple locations in the matrix."[16]

The fifth element of claim 23 recites "program code for receiving a sensor signal from a sensor, the sensor configured to detect a movement of a user manipulatable object of an interface device and the sensor signal associated with the movement." The specification discloses that

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[10] See, e.g., Specification at ¶¶ 29-34.
[11] See, e.g., Specification at ¶ 33; Fig. 3.
[12] See, e.g., Specification at ¶ 28.
[13] See, e.g., Specification at ¶ 28 ("In one embodiment, the cell 10 comprises a plurality of parameters, including a wall 12, a detent 14, a location 16, and a dead-band 18."), ¶ 32 ("the cells 21 each comprise parameters inclouding a detent 24, a location 26, and a dead-band 28.").
[14] See, e.g., Specification at ¶¶ 27-29.
[15] See, e.g., Specification at ¶¶ 31-34.
[16] Specification at ¶ 31.

sensors detect movement of a manipulandum and provide sensor signals associated with that movement. For example, the specification discloses that one or more sensor may be used to detect position, motion, displacement, and other properties of the manipulandum and that the detected information is communicated to a processor.[17]

The sixth element of claim 23 recites "program code for determining an interaction between the position of the graphical object and at least one of the plurality of graphical input elements." The specification further discloses that a cursor may interact with graphical input elements, such as keys in a keypad.[18]

The seventh element of claim 23 recites "program code for outputting the first haptic effect based at least in part on the first parameter and the interaction, the haptic effect configured to resist or assist the movement of the user manipulatable object." The specification describes that a haptic effect based on an interaction between a graphical object and a graphical input element and the corresponding cell may be generated and output to the manipulandum. For example, the specification discloses that the cell's parameters may be used to output effects to guide a manipulated object.[19]

Claim 16 claims a switch. The first element of claim 16 recites "a sensor." The specification discloses a number of different types of sensors, including sensors for detecting position, pressure, motion, direction, etc.[20]

The second element of claim 16 recites "an actuator configured to output a haptic effect." The specification discloses a number of different kinds of actuators and that one or more actuators may be used to output haptic effects.[21]

The third element of claim 16 recites "a processor in communication with the sensor and the actuator, the processor configured to receive a sensor signal from the sensor, and to cause the actuator to generate a haptic effect based at least in part on the sensor signal." The specification discloses that sensor signals can be communicated to a processor which is also configured to cause an actuator to output a haptic effect.[22]

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[17] Specification at ¶ 46.
[18] Id.
[19] See, e.g., Specification at ¶¶ 29-34.
[20] See, e.g., Specification at ¶ 46.
[21] See, e.g., Specification at ¶¶ 47-48.
[22] See, e.g., Specification at ¶¶ 46-47.

Claim 16 further recites "wherein the haptic effect is based on a plurality of detents defining: a first primary channel defined along a first axis, a second primary channel defined along a second axis, a first secondary channel proximate to the first primary channel, and a second secondary channel proximate to the second primary channel." The specification discloses that channels may be based on detents.[23] The specification further discloses such a configuration of channels. F or example, one such embodiment is disclosed in paragraph 75 of the specification and shown in Figure 13.

Claim 16 further recites "the plurality of detents configured to substantially constrain movement of an interface device to one of the first primary channel, the second primary channel, the first secondary channel, or the second secondary channel, wherein: each channel is a substantially one-dimensional channel, the first primary channel intersects the second primary channel, the first secondary channel intersects one of the first or second primary channel, and the second secondary channel intersects one of the first or second primary channels or the first secondary channel." The specification discloses that movement of a device is constrained within the various channels by the detents so as to allow navigation of the channels based on the haptic effects.[24]

Grounds of Rejection to be Reviewed on Appeal

There are 2 issues presented for appeal:

(1) Whether claims 1-11 and 23-25 are patentable over the combination of U.S. Patent No. 6,819,312 to Fish ("Fish") in view of U.S. Patent No. 6,084,587 to Tarr et al ("Tarr") and further in view of U.S. Patent No. 6,631,000 to Reinkensmeyer et al ("Reinkensmeyer") and U.S. Patent No. 6,954,899 to Anderson ("Anderson"); and

(2) Whether claims 12-22 are patentable over Anderson in view of U.S. Patent No. 7,081,883 to Chen ("Chen").

[23] See, e.g., Specification at ¶¶ 61-67.
[24] See, e.g., Specification at ¶¶ 61 *et seq.*

Argument

Issue 1: Whether claims 1-11 and 23-25 are patentable over the combination of Fish in view of Tarr and further in view of Reinkensmeyer and Anderson.

Claims 1-11 and 23-25 are patentable over Fish in view of Tarr and further in view of Reinkensmeyer and Anderson because the combined references do not disclose or suggest "defining a graphical user interface having a plurality of graphical input elements arranged in a matrix configuration." In addition, the combined references do not disclose or suggest "defining a first cell, the first cell comprising a first parameter representing a first haptic effect." Finally, the combined references do not disclose or suggest "the haptic effect configured to resist or assist the movement of the user manipulatable object." Therefore, Applicant respectfully requests the Board reverse the Examiner's rejections of claims 1-11 and 23-25.

Fish does not disclose "defining a graphical user interface having a plurality of graphical input elements arranged in a matrix configuration." For this element of claim 1, the Examiner has cited to item 604 shown, for example, in Figure 6A of Fish.[25] However, item 604 in Fish is disclosed to be a "haptel grid."[26] A haptel grid in Fish is a physical device having a number of individual haptels, each of which is "a haptic feedback device with linear motion having a touchable surface substantially perpendicular to the direction of motion"[27] and includes "a moving assembly and a stationary assembly."[28] However, as is discussed in the specification and is known to one of skill in the art, a graphical user interface is not a physical device, but rather a graphical interface displayed on a screen.[29] Thus, neither the haptel grid nor the individual haptels defines a graphical user interface, nor is either a graphical input element. Further, the

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[25] Final Office Action at 8-9.
[26] Fish, col. 9, lines 2-6.
[27] Fish, col. 4, lines 21-24.
[28] Fish, col. 9, lines 2-3 ("The rectangularly arranged set of nine haptels is referred to as a haptel grid 604."); Id at column 7, lines 28-33 ("FIG. 1 illustrates various aspects of one embodiment of a haptel according to the present invention and exemplified by a haptel500. Haptel 500 includes, primarily, two assemblies: a moving assembly 100 and stationary assembly 300. FIG. 1 illustrates an exploded perspective view of the parts of moving assembly 100.")
[29] See, e.g., Peter Aiken et al., Microsoft Computer Dictionary 239 (Sandra Haynes ed., Microsoft Press 5th ed. 2002) ("graphical user interface – A visual computer environment that represents programs, files, and options with graphical images, such as icons, menus, and dialog boxes, on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, with the keyboard. A particular item (such as a scroll bar) works the same way for the user in all applications, because the graphical user interface provides standard software routines to handle these elements and report the user's actions (such as a mouse click on a particular icon or at a particular location in text, or a key press); applications call these routines with specific parameters rather than attempting to reproduce them from scratch. *Acronym:* GUI").

arrangement of haptels in a haptel grid is not a plurality of graphical input elements arranged in a matrix configuration. Rather, the haptel grid is a physical assembly made up of a number of individual physical components, not graphical objects displayed on a screen as a part of a graphical user interface. Thus, Fish does not disclose or suggest "defining a graphical user interface having a plurality of graphical input elements arranged in a matrix configuration."

Further, Fish does not disclose "defining a first cell, the first cell comprising a first parameter representing a first haptic effect." The Examiner has alleged that a group of haptels to output a haptic effect discloses this limitation.[30] However, as recited in the present specification, a cell is "a memory construct in which parameters represent or define haptic effects."[31] A grouping of haptels is not a memory construct in which parameters represent or define haptic effects. While multiple haptels may output haptic effects, they are physical devices, whether actuated individually or in a group and thus are not memory constructs. Further, they are not, and do not have, parameters that represent or define haptic effects. Again, they are simply physical devices that are capable of outputting haptic effects. Thus, Fish does not disclose or suggest "defining a first cell, the first cell comprising a first parameter representing a first haptic effect." Tarr, Reinkensmeyer, and Anderson do not cure Fish's noted deficiencies.

Finally, the combined references do not disclose or suggest "the haptic effect configured to resist or assist the movement of the user manipulatable object." The Examiner has acknowledged that Fish in view of Tarr does not disclose such an element, and thus has introduced Reinkensmeyer, which discloses a joystick, to disclose such an element. However, the Examiner has not provided any basis on which the Fish haptels and the Reinkensmeyer joystick could be combined. The Examiner's argument is simply that a joystick in combination with a touch pad haptic device would create a system for user rehabilitation.[32] It is not clear how the haptels of Fish could be combined with a joystick, or if such a combination would be possible at all. Further, the introduction of the joystick for this element is internally inconsistent with the Examiner's position that the Fish haptels are the user manipulable object, whose movement is sensed.[33] Claim 1 recites that "the haptic effect configured to resist or assist the

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[30] Final Office Action at 9.
[31] See, e.g., Specification at ¶ 28.
[32] Final Office Action at 10.
[33] Final Office Action at 9 ("i.e. the control processor 904 examiner [sic] the sensor data where both the [sic] of the haptel area is contacted by the step 1008 [sic], and the computer having display cursor which are objects [sic] that in [sic] interacted upon by the touch control system.")

movement of the user manipulatable object," i.e. the haptels according to the Examiner's rejections,[34] not some other device. Thus, claim 1 is patentable over Fish in view of Tarr and further in view of Reinkensmeyer and Anderson.

Claim 23, which recites similar elements as claim 1 and was rejected on the same bases as claim 1, is likewise patentable over Fish in view of Tarr and further in view of Reinkensmeyer and Anderson for at least the same reasons.

Claims 2-11, 24, and 25 each depend from and further limit one of claims 1 or 23, each of claims 2-11, 24, and 25 is patentable over Fish in view of Tarr and further in view of Reinkensmeyer and Anderson for at least the same reasons.

In view of the foregoing arguments, Applicant respectfully asserts that claims 1-11 and 23-25 are patentable over Fish in view of Tarr and further in view of Reinkensmeyer and Anderson. Applicant respectfully requests the Board reverse the Examiner's rejections of the claims.

Issue 2: Whether claims 12-22 are patentable over Anderson in view of Chen.

Anderson in view of Chen does not disclose or suggest "the plurality of detents [is] configured to substantially constrain movement of an interface device to one of the first primary channel, the second primary channel, the first secondary channel, or the second secondary channel, wherein: each channel is a substantially one-dimensional channel, the first primary channel intersects the second primary channel, the first secondary channel intersects one of the first or second primary channel, and the second secondary channel intersects one of the first or second primary channels or the first secondary channel" as recited in claim 16.

Anderson does not disclose such functionality. While Anderson discloses areas surrounded by haptic boundaries, it does not disclose substantially one dimensional areas surrounded by haptic boundaries. Rather, it discloses two-dimensional and three-dimensional regions surrounded by boundaries. While this may appear to be a distinction without a difference, claim 16 also recites various intersections between channels and that movement of an interface device is constrained to one of the channels. Anderson does not disclose intersections between multiple two-dimensional and three-dimensional areas. Further, Anderson does not

[34] Note that the haptels are also identified as the graphical user interface and the graphical input element.

disclose how such intersections might be realized. Instead, Anderson is devoid of disclosure regarding the claimed intersections between channels and constraining movement of a manipulandum to only one of such channels. Thus, Anderson does not disclose "the plurality of detents [is] configured to substantially constrain movement of an interface device to one of the first primary channel, the second primary channel, the first secondary channel, or the second secondary channel, wherein: each channel is a substantially one-dimensional channel, the first primary channel intersects the second primary channel, the first secondary channel intersects one of the first or second primary channel, and the second secondary channel intersects one of the first or second primary channels or the first secondary channel" as recited in claim 16. Chen does not cure this deficiency.

Chen discloses a "low-profile multi-channel user interface device."[35] Chen discloses that its "channels" are simply the vector components of user inputs having magnitudes in the X, Y, and Z axes.[36] These are not the claimed "channels," they are merely directional inputs. Further, the Examiner argues that Chen discloses the claimed arrangement of channels because "in Chen's dual touch control interface the channels are divided into two primary set and two secondary set of X and Y channel where the user interact with each of the finger where the primary channel and secondary channel intersect in the actual plan of control of the computer."[37] The Examiner's argument is not entirely clear; however, the Examiner's position appears to be that because two fingers may be used to control the Chen device, there are consequently two channels. If the two fingers depressions in the Chen are argued to correspond to the claimed channels, there are myriad difficulties with the Examiner's position. Such a position is contrary to the plain language of claim 16, which recites that the channels are defined by detents and that movement of the interface device is constrained to only one of the claimed channels. Additionally, Chen discloses that both depressions may be used simultaneously, which is contrary to the recitations in claim 16. Further, the depressions themselves are not substantially one dimensional and are not defined by a plurality of detents. In addition, the Chen device is disclosed as moveable in multiple degrees of freedom (translational and rotational) simultaneously with no restriction to only a single direction or within a single channel of a plurality of channels as recited in claim 16. Thus, like Anderson, Chen does not disclose "the

[35] Chen, Title.
[36] Chen, col. 6, lines 14-63.
[37] Final Office Action at 4.

plurality of detents [is] configured to substantially constrain movement of an interface device to one of the first primary channel, the second primary channel, the first secondary channel, or the second secondary channel, wherein: each channel is a substantially one-dimensional channel, the first primary channel intersects the second primary channel, the first secondary channel intersects one of the first or second primary channel, and the second secondary channel intersects one of the first or second primary channels or the first secondary channel" as recited in claim 16. Thus, Anderson in view of Chen does not disclose or suggest each and every element of claim 16. Therefore, claim 16 is patentable over Anderson in view of Chen. Applicant respectfully requests the Examiner withdraw the rejection of claim 16.

Because claims 12-15 and 17-22 depend from and further limit claim 16, each of claims 12-15 and 17-22 are patentable over Anderson in view of Chen for at least the same reasons. Applicant respectfully requests the Examiner withdraw the rejection of claims 12-15 and 17-22.

Conclusion

In view of the foregoing, Applicant respectfully requests the Board reverse the Examiner on all grounds.

Respectfully submitted,

Date: July 18, 2011

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Appendix A – Claims

1. A method comprising:

defining a graphical user interface having a plurality of graphical input elements arranged in a matrix configuration;

defining a first cell, the first cell comprising a first parameter representing a first haptic effect;

assigning the first cell to a first graphical input element in the matrix configuration;

assigning the first cell to a second graphical input element in the matrix configuration;

receiving a sensor signal from a sensor, the sensor configured to detect a movement of a user manipulatable object of an interface device and the sensor signal associated with the movement;

determining a position of a graphical object based at least in part on the sensor signal;

determining an interaction between the position of the graphical object and at least one of the plurality of graphical input elements; and

outputting the first haptic effect based at least in part on the first parameter and the interaction, the haptic effect configured to resist or assist the movement of the user manipulatable object.

2. The method of claim 1, further comprising communicating the first cell from a first processor to a second processor.

3. The method of claim 2, further comprising:

defining a second cell, the second cell comprising a second parameter representing a second haptic effect;

communicating the second cell from the first processor to the second processor; and

assigning the second cell to a third input element in the matrix configuration.

4. The method of claim 3, wherein the first and second cells are defined by the first processor and the first, second, and third input elements are assigned by the second processor.

5. The method of claim 3, wherein the third input element is disposed between the first and second input elements.

6. The method of claim 1, wherein the matrix configuration comprises a square shape.

7. The method of claim 1, wherein the matrix configuration comprises a circular shape.

8. The method of claim 1, wherein the first cell comprises a first detent and the second cell comprises a second detent.

9. The method of claim 3, further comprising providing an actuator in communication with the first, second, and third input elements, the actuator operable to provide a computer-modulated force to the first, second, and third input elements.

10. (Original) The method of claim 2, wherein the second processor is disposed remotely from the first processor.

11. The method of claim 1, wherein the first cell comprises an arc and first and second edges; and wherein the haptic effect comprises a plurality of force vectors within the first cell, the force vectors directed outward from a centerline of the first cell toward the first and second edges.

12. The switch of claim 16, wherein the switch comprises a circular shape.

13. The switch of claim 16, wherein the switch comprises an eight-way switch, the eight-way switch operable to select a channel about a first axis.

14. The switch of claim 16, further comprising providing a biasing element proximate to a center of the switch.

15. The switch of claim 16, further comprising providing a detent proximate to a radius of the switch.

16. A switch comprising:

a sensor;

an actuator configured to output a haptic effect; and

a processor in communication with the sensor and the actuator, the processor configured to receive a sensor signal from the sensor, and to cause the actuator to generate a haptic effect based at least in part on the sensor signal, wherein the haptic effect is based on a plurality of detents defining:

a first primary channel defined along a first axis,

a second primary channel defined along a second axis,

a first secondary channel proximate to the first primary channel, and

a second secondary channel proximate to the second primary channel,

the plurality of detents configured to substantially constrain movement of an interface device to one of the first primary channel, the second primary channel, the first secondary channel, or the second secondary channel, wherein:

each channel is a substantially one-dimensional channel,

the first primary channel intersects the second primary channel,

the first secondary channel intersects one of the first or second primary channel, and

the second secondary channel intersects one of the first or second primary channels or the first secondary channel.

17. The switch of claim 16, further comprising:

a third primary channel defined substantially co-axial with the first primary channel;

a fourth primary channel defined substantially co-axial with the second primary channel;

a third secondary channel defined proximate to the third primary channel; and

a fourth secondary channel defined proximate to the fourth primary channel.

18. The switch of claim 17, wherein the first axis is substantially orthogonal to the second axis.

19. The switch of claim 16, wherein the first secondary channel is oblique to the first primary channel; and the second secondary channel is oblique to the second primary channel.

20. The switch of claim 16, wherein the first secondary channel is substantially orthogonal to the first primary channel; and the second secondary channel is substantially orthogonal to the second primary channel.

21. The switch of claim 17, wherein the third secondary channel is oblique to the third primary channel; and the fourth secondary channel is oblique to the fourth primary channel.

22. The switch of claim 17, wherein the third secondary channel is substantially orthogonal to the third primary channel; and the fourth secondary channel is substantially orthogonal to the fourth primary channel.

23. A computer-readable medium comprising program code, the program code comprising:

program code for defining a graphical user interface having a plurality of graphical input elements arranged in a matrix configuration;

program code for defining a first cell, the first cell comprising a first parameter representing a first haptic effect;

program code for assigning the first cell to a first graphical input element in the matrix configuration;

program code for assigning the first cell to a second graphical input element in the matrix configuration;

program code for receiving a sensor signal from a sensor, the sensor configured to detect a movement of a user manipulatable object of an interface device and the sensor signal associated with the movement;

program code for determining an interaction between the position of the graphical object and at least one of the plurality of graphical input elements; and

program code for outputting the first haptic effect based at least in part on the first parameter and the interaction, the haptic effect configured to resist or assist the movement of the user manipulatable object.

24. The computer-readable medium of claim 23, further comprising program code for communicating the first cell from a first processor to a second processor.

25. The computer-readable medium of claim 24, further comprising:

program code for defining a second cell, the second cell comprising a second parameter representing a second haptic effect;

program code for communicating the second cell from the first processor to the second processor; and

program code for assigning the second cell to a third input element in the matrix configuration.

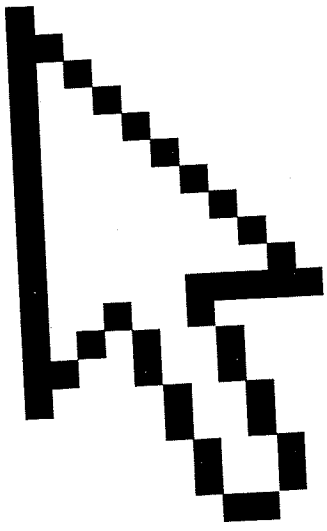
Appendix B – Evidence

Peter Aiken et al., Microsoft Computer Dictionary 239 (Sandra Haynes ed., Microsoft Press 5th ed. 2002).

Appendix B - Evidence

Microsoft® Computer Dictionary

Fifth Edition



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graph is weighted if each edge has some value associated with it. *See also* node (definition 3), tree. **2.** *See* chart.

Graphical Device Interface *n. See* GDI.

graphical interface *n. See* graphical user interface.

Graphical Kernel System *n.* A computer graphics standard, recognized by ANSI and ISO, that specifies methods of describing, manipulating, storing, and transferring graphical images. It functions at the application level rather than the hardware level and deals with logical workstations (combinations of input and output devices such as keyboard, mouse, and monitor) rather than with individual devices. Graphical Kernel System was developed in 1978 to handle two-dimensional graphics; the later modification, GKS-3D, extended the standard to three-dimensional graphics. *Acronym:* GKS. *See also* ANSI, ISO.

graphical user interface *n.* A visual computer environment that represents programs, files, and options with graphical images, such as icons, menus, and dialog boxes, on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, with the keyboard. A particular item (such as a scroll bar) works the same way for the user in all applications, because the graphical user interface provides standard software routines to handle these elements and report the user's actions (such as a mouse click on a particular icon or at a particular location in text, or a key press); applications call these routines with specific parameters rather than attempting to reproduce them from scratch. *Acronym:* GUI.

graphic character *n.* Any character that is represented by a visible symbol, such as an ASCII character. A graphic character is not the same as a graphics character. *Compare* graphics character.

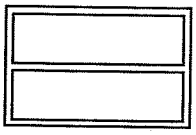
graphic limits *n.* On a computer screen, the boundary of a graphical image in a graphics software program, including all the area enclosed within the graphic. In some graphics environments the limits of a graphic consist of the smallest rectangle that can completely enclose it, called its *bounding rectangle* or *bounding box.*

graphics accelerator *n.* A video adapter that contains a graphics coprocessor. A graphics accelerator can update the video display much more quickly than the CPU can, and it frees the CPU for other tasks. A graphics accelerator is a necessity for modern software such as graphical user interfaces and multimedia applications. *See also* graphics coprocessor, video adapter.

graphics adapter *n.* A video adapter capable of displaying graphics as well as alphanumeric characters. Almost all video adapters in common use today are graphics adapters.

graphics card *n. See* video adapter.

graphics character *n.* A character that can be combined with others to create simple graphics, such as lines, boxes, and shaded or solid blocks. See the illustration. *Compare* graphic character.



Graphics character. *Box built up from line graphics characters.*

graphics controller *n.* The part of the EGA and VGA video adapters that allows the computer to access the video buffer. *See also* EGA, VGA.

graphics coprocessor *n.* A specialized microprocessor, included in some video adapters, that can generate graphical images such as lines and filled areas in response to instructions from the CPU, freeing the CPU for other work.

graphics data structure *n.* A data structure that is designed specifically for representing one or more elements of a graphical image.

graphics engine *n.* **1.** A display adapter that handles high-speed graphics-related processing, freeing the CPU for other tasks. *Also called:* graphics accelerator, video accelerator. **2.** Software that, based on commands from an application, sends instructions for creating graphic images to the hardware that actually creates the images. Examples are Macintosh QuickDraw and Windows Graphics Device Interface (GDI).

graphics export component *n.* A technology developed by Apple for creating, editing, publishing, and viewing multimedia content. The graphics export component provides an application programming interface that enables a QuickTime player to export still images into a variety of file formats.

graphics import component *n.* A technology developed by Apple for creating, editing, publishing, and viewing multimedia content. The graphics import component provides an application programming interface that enables a QuickTime player to import still images from a variety of file formats.

Appendix C – Related Proceedings

None.